The last section of the biological programme deals with the importance of elaborating fishery statistics so as to yield data for constructing maps of the fishing grounds, and for determining the influence of physical conditions on fish.

With regard to the apparatus to be used in these observations, Prof. Nansen, Dr. Hjort and Mr. Garstang gave a demonstration on board the *Isbjorn* in Christiania fjord of the insulating water-bottle as used for exact measurements of temperature, and of various forms of closing tow-nets.

C. *Organisation of the International Council, Central Bureau and International Laboratory.*—The organisation which is to put the elaborate system of observations recommended by the Conference into operation and to record and work out the result is obviously the most important part of the whole scheme, as upon its successful working depends the whole of the success of the attempt at concerted action. The International Council is thus described:—

"The permanent International Council shall consist of commissioners elected by the Governments interested. Each Government should appoint two commissioners who may be represented at meetings by substitutes, and may be accompanied by experts who, however, shall not be competent to vote.

"The council elects its president and vice-president and appoints all officials of the Central Bureau. Should the general secretary represent hydrographic science, one of his principal assistants should be a biologist, and *vice versa*. The other assistant shall preferably be experienced in statistical work. . . .

"It will be for the Governments concerned to decide among themselves the amount of the contributions to the Central Organisation. The expenses of the Central Organisation are approximately estimated at 4800*l*. yearly. . . .

"The purpose of the Central Bureau will be:

"To give uniform directions for the hydrographic and biological researches in accordance with the resolutions drawn up in the programme of the present Conference, or in accordance with such modifications as may be introduced later with the consent of the States represented.

"To undertake such particular work as may be entrusted to it by the participating Governments.

"To publish periodical bulletins which shall contain the actual data obtained in the cruises of all the participating States at the earliest possible date, and also such other papers as may prove useful in coordinating the international work. . . .

"The site of the Central Bureau, to be decided by the Governments concerned, shall at the same time be the residence of the general secretary.

"The purpose of the International Laboratory shall be:—

"To control apparatus and to ensure uniformity of methods. The various apparatus and instruments now used for oceanic research should be examined in order to settle which are the most trustworthy. Experiments may also be made to improve the apparatus and instruments or to construct new and better ones.

"The water-samples sent by the workers of the participating States are to be analysed and examined at the Central Laboratory, from which also samples of standard water should be provided. . . .

"The International Laboratory is subordinate to the Central Council, to which its accounts shall be rendered. Its operations shall be reported to the Central Bureau.

"The site of the Central Laboratory shall be decided by the Governments concerned, and should be conveniently situated for oceanic researches."

The relations of the Central Bureau and the International Laboratory will probably be somewhat difficult to define, and the success of the two practically independent institutions will depend on the strength and tact of the International Council, the selection of the members of which will devolve upon the Governments associating themselves with the work.

Resolutions.—The general resolutions adopted by the Conference included an expression of the desirability of the provision of at least one steamer specially adapted for marine research by each of the participating States. This is so self-evident as hardly to require statement. Norway already possesses such a vessel in the *Michael Sars*, which has already done excellent work under Dr. Hjort; Russia has also equipped a vessel for fishery observations, and Germany has sanctioned a very carefully-planned ship, involving some very important innovations, which is now, we believe, almost ready to be launched. To carry out the British share of the work properly two vessels will be required, and for so promising a field of practical application of science it seems reasonable to hope that they will be provided.

The opinion is formally expressed that the Central Bureau should commence operations as soon as possible, and not later than the beginning of next year, while the first set of international cruises should take place not later than May 1902. To make this possible it is recommended that the International Council should meet in Copenhagen as soon as the participating Governments decide to accept the programme of the Conference.

A resolution expresses sympathy with the efforts of Governments which are endeavouring in the face of difficulties from foreign trawlers to preserve an area, such, *e.g.*, as the Moray firth, from fishing operations, for experimental purposes. Another thanks Dr. Knudsen for his recently published hydrographical tables, in which he gives a new determination of the physical constants of sea-water. The remaining resolutions suggest methods for graphically representing the dynamics of oceanic movements, approve of the inclusion of observations on fresh-water lakes simultaneous with, and similar to, those on the sea, and point out the importance for deep-sea fisheries and for weather forecasts of bringing the Faeroes and Iceland into the telegraphic system of Europe.

It remains now for the Governments of the northern marine nations of Europe to give effect to this carefully planned scheme.

H. R. M.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The following is the text of the speech delivered by Prof. Love in presenting Dr. P. L. Sclater for the degree of D.Sc. *honoris causa*, on June 20:—

Adest Philippus Lutley Sclater, Sodalis Societatis Regalis, Magister Artium in Academia nostra, Philosophiæ Doctor in Bonnensi, Collegii Corporis Christi Socius honoris causa creatus. Qui vir, ut primos eius annos et incunabula laudis breviter præstringam, si quis alius, vere Wiccamicus vocandus est, cum non solum ipse et postea duo eius filii sed olim pater atque avus in illustrissima Schola Beatæ Mariæ de Winton instituti sint. Ita per quattuor hominum ætates huius domus nomen in annalibus Wiccamicis notissimum. Nostræ mox Academiæ particeps et Collegii Corporis Christi alumnus duos fere et quinquaginta abhinc annos graduatus est.

In ὀρνιθολογίᾳ quam vocant hic profecto familiam ducit: hoc gubernante Societas Zoologica Britannica laude maxima floret; horti autem Zoologici Londinenses nullis usquam cedunt. Quod ad doctrinam exquisitiorem et rei Zoologicæ peritiam attinet, illud potissimum dixerim, hunc regionum Zoologicarum naturam et limites primum perspexisse cum regionibus sex constitutis, Palæarctica, Nearctica, Neotropicali, Æthiopica, Orientali, Australi, orbem terræ non hominum civitatibus sed ferarum generibus partiretur. Quam rationem quinquaginta fere abhinc annos excogitatam plurimi ita emendare et corrigere conati sunt, quo in numero erat ipse Huxley, vir in hoc genere doctrinæ præstantissimus, ut etiam hodie probatissima et naturæ convenientissima esse videatur. Multa docuit hic vir ingeniosissimus quæ adhuc omnium iudicio comprobantur, velut Africæ septentrionalia harenosæ Nomadum solitudini superiacentia re vera Palæarctica esse atque Europæ affinia; Arabiæ autem meridiana in regionem Africanam sive Æthiopicam cadere: de duabus etiam Americæ continentibus felicissime monuit, hanc ab illa dividi, non isthmo illo Panamensi, sed septentrionali Mexicæ latere, cum ultra citraque hanc quasi lineam accuratissime descriptam diversissima ferarum genera inveniantur.

SIR HENRY ROSCOE, F.R.S., has been elected Vice-Chancellor of the University of London for the ensuing year.

PROF. J. G. MACGREGOR, F.R.S., professor of physics in Dalhousie College, Halifax, Nova Scotia, has been elected to succeed Prof. Tait as professor of physics in the University of Edinburgh.

DR. F. H. NEWMAN, of the Royal College of Science, London, has been appointed director of technical education and principal of Tullie House, Carlisle. Tullie House consists of a public library, museum and school of art. It is the intention of the committee to build a technical school at an early date, the land having been already purchased. Dr. Newman commences his duties on July 1.

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REPLYING to a question as to the terms of reference to the Royal Commission on University Education in Ireland, in the House of Commons on Thursday last, Mr. Balfour said they were as follows :—" To inquire into the present condition of the higher general and technical education available in Ireland outside Trinity College, Dublin, and to report as to what reforms, if any, are desirable in order to render that education adequate to the needs of the Irish people." The chairman is Lord Robertson, and among the other members are Profs. Ewing, Rücker and J. Lorrain Smith.

IN opening an exhibition of practical work done in connection with the City and Guilds of London Institute, at the Imperial Institute, Lord Avebury referred to the dependence of technological instruction upon the sound teaching of science, and some defects of school work in general, when considered from an educational point of view. He pointed out that our great public schools were bound under the regulations of the Public School Commission to give one-tenth of the marks in all examinations to science and one-tenth to modern languages. But this obligation was systematically ignored. At the greatest of our schools there were twenty-eight classical masters, thirteen mathematical, and only four science masters for more than 900 boys. The University of London, which he had the great honour of representing in Parliament for more than twenty years, had always taken a leading part in endeavouring to secure for science its proper place in our educational system. It was the first to give science degrees. It made a knowledge of science an obligatory part of the matriculation examination, that no University degree should be given to any one who, taking the line that literature, science and mathematics were necessary elements in any well-though-out education, was not well grounded in all three. It was difficult to over-estimate the important and beneficial effect which this had had on our secondary schools, and he deeply regretted that it had been proposed to drop science out of the list of obligatory subjects in the matriculation examination. It was greatly to be hoped that the Senate would not adopt a recommendation which was so retrograde and so opposed to the whole traditions of the University, and which he did not hesitate to say would be a national misfortune. The Chambers of Commerce did not wish, nor, he was sure, did scientific men wish, to exclude classics. What they pleaded for was that science, the knowledge of the beautiful world in which we lived, should not be excluded.

SCIENTIFIC SERIALS.

Bulletin of the American Mathematical Society, June.—The number opens with an account of the proceedings at the two April meetings of the Society. The Chicago section held its meeting at the University of Chicago on April 6. Ten papers were read, and abstracts of the papers are edited by Prof. T. F. Holgate. The other meeting was held in New York City on April 27. To relieve the increasing burden of administration, Dr. Edward Kasner was appointed assistant secretary, to serve until February 1902. This gentleman reports the proceedings and gives abstracts of several of the seventeen papers which were communicated.—The value of

$$\int_0^{\frac{\pi}{2}}(\log 2\cos\phi)^m\phi^n d\phi$$

is a notelet which was read before the April (1899) meeting of the Society by Prof. F. Morley.—Dr. Kasner's paper on the algebraic potential curves (read February 23, 1901) has for its object the derivation of the characteristic geometric properties of a class of curves which are of interest in connection with the theory of equations and of the potential function. Analytically, these curves are obtained by equating to zero the rational integral solutions $\phi(x, y)$ of Laplace's equation

$$\Delta\phi \equiv \frac{\partial^2\phi}{\partial x^2}+\frac{\partial^2\phi}{\partial y^2}=0,$$

or, what is equivalent, the real (or imaginary) parts of the rational integral functions of $x+iy$.—Various geometric properties are given in Briot and Bouquet's "Théorie des Fonctions Elliptiques" (book iv. chap. ii.), but none are completely characteristic. The several sections treat of (1) apolarity with respect to a point pair, (2) polar properties of potential curves, (3) focal properties, (4) the asymptotes, and (5) the connection with the theory of equations. Several useful references are given in footnotes.—The reviews are of Steinmetz's "Alternating Current Phenomena," by J. B. Whitehead, jun., and of de Tannenberg's "Leçons Nouvelles sur les Applications Géométriques du Calcul Differential," by L. P. Eisenhart.—The usual information follows in the notes and new publications.

American Journal of Science, June.—The new spectrum, by S. P. Langley. A short account of the methods adopted for mapping the spectrum in the ultra-red. The paper is accompanied with a map of this spectrum for wave-lengths between 0·76 μ and 5·3 μ.—On the rival theories of cosmogony, by O. Fisher. A discussion of the meteoric and nebular hypotheses. A study of some American fossil Cycads. Part iv. On the microsporangiate fructification of Cycadeoides, by G. R. Wieland. It was suggested in a previous paper that the sorus-bearing axis is a series of twelve fused leaves or fronds with their sorus-bearing pinnacles turned inwards. More extended study of additional material in a far superior state of preservation has confirmed the above hypothesis as a correct one.—Studies of Eocene mammalia in the Marsh collection in the Peabody Museum, by J. L. Wortman. A continuation of a previous paper.—On the cæsium-antimonious fluorides and some other double halides of antimony, by H. L. Wells and F. J. Metzger. A description of the mode of preparation and properties of five double salts of the composition $CsF.3SbF_3$, $CsF.2SbF_3$, $4CsF.7SbF_3$, $CsF.SbF_3$ and $2CsF.SbF_3$, mohawkite, by J. W. Richards.—The life-work of Prof. H. A. Rowland, by H. F. Reid.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 28.—" On the Results of Chilling Copper-Tin Alloys." By C. T. Heycock and F. H. Neville.

Sir W. Roberts-Austen and Dr. Stansfield have shown that the cooling curves of many copper-tin alloys exhibit well-marked "arrest points," or halts in the cooling due to the evolution of heat. From the temperatures at which these halts occur it is certain that many important changes take place long after the alloy has apparently become solid. Thus the authors find that an alloy of the composition $Cu_{81}Sn_{19}$ shows well-marked halts in cooling at the temperatures 754° C., 743° C., 558° C. and 490° C., the temperature at which solidification appears complete being but little below the second of the numbers. The exact nature of the changes causing the lower halts has until recently been obscure, but Prof. Roozeboom, by his paper on " Binary Systems Producing Mixed Crystals," has thrown much light on these phenomena.

The present paper is an attempt to apply Roozeboom's theory to the copper-tin alloys.

The authors, by slowly cooling small ingots of alloy to definite temperatures near the "arrest points" of the cooling curve, and then suddenly chilling them by immersion in water, have been able to prevent the subsequent changes due to slow cooling from taking place. The structures formed during the slow cooling down to the moment of chilling were thus fixed and could be examined.

It follows from Roozeboom's theory that in the solidification of a liquid mixture that can form mixed crystals the crystals first formed will generally differ in composition from the liquid, but that these crystals will change in composition as the solidification proceeds, and that in many cases at temperatures slightly below that of complete solidification the solid will consist of a uniform mass of mixed crystals. He further discusses the possibility of the solid solution thus formed breaking up into separate phases by crystallisation in the solid at lower temperature.

This paper contains photographs of three chills of the same alloy, $Cu_{81}Sn_{19}$, which illustrate these changes. In the first case the alloy was chilled at 740° C. (Fig. 1), while it was still partly fluid, and the photograph shows large primary combs much richer in copper than the mother substance.

Another portion of the same alloy was chilled at 630° C. (Fig. 2), a temperature at least 100 degrees below that of solidification. Even when etched or attacked in a variety of ways this sample shows no detail indicating any difference of composition; it appears to be homogeneous, or very nearly so. It has reached the stage of uniform mixed crystals.

Another fragment was chilled at 500° C. (Fig. 3), close to the lowest "arrest point." The photograph shows that crystallisation has taken place in the solid solution and that a substance rich in tin has crystallised in rosettes and bands, leaving a mother substance rich in copper.

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